NOVA FOREST ALLIANCE

CONTRACTORS & OPERATORS

Best Management Practices Manual

APRIL, 2001

Natural Resources Canada | Ressources naturelles Canada

Canada

A Contractors Code of Practice

I will conduct forest operations in accordance with a mutually developed woodlot operations plan that recognizes landowner objectives and ecological values.

I will plan and operate in a manner designed to protect significant wildlife habitat.

I will conduct harvesting operations to facilitate forest renewal.

I will construct forest roads in a manner that minimizes impact on the environment.

I will operate with due diligence for the health and safety of employees and the public

I will promote public awareness of sustainable forest management and respond to public concerns about forest practices in a sensitive and progressive manner.

I will participate with the Nova Forest Alliance in monitoring and evaluating my compliance with these principles.

Contractor

Chair, Nova Forest Alliance

Table of Contents

1 This Manual is for you, the Contractor

3 Introduction: Sustainable Forest Management and the Contractor

7 Developing Landowner Agreements: Best Management Practices

17 Road Construction: Best Management Practices

23 Wildlife Habitat: Best Management Practices

29 Harvesting Best Management Practices

41 Ensuring a Safe Operation: Best Management Practices

43 Self Auditing: Best Management Practices

51 Additional Resources

55 Useful Phone Numbers

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This Manual is for you, the Contractor

As Chair of the Nova Forest Alliance (NFA) Contractors and Operators Committee I am pleased to provide you with a copy of the Contractors and Operators Best Management Practices Manual. This manual was developed by forest contractors and operators in order to address the NFA goal to improve forest practices within the NFA area. While laws and regulations either exist or are in the planning stages for some activities (i.e., Forest/Wildlife Guidelines and Standards, Forests Act, Forest Sustainability Regulations), we know that government regulations can never cover all aspects of forestry operations. This is particularly difficult when new research into the impacts of forest practices requires us to continually adapt and change our operations to ensure we are doing what is right for the forest and the environment. With the majority of the land-base being the responsibility of small private woodland owners who may have varied knowledge of forest practices, the responsibility will often rest on the contractor to provide the best advice and implement the most appropriate practice on the ground.

It is with this in mind that we propose a Code of Practice including a series of Best Management Practices (BMP's) for your consideration. This code does not tell you how to carry out your work on any given site but clearly sets those standards that if followed by all contractors will ensure that work is properly planned, executed and communicated to those involved.

The document proposes a BMP on how to develop an effective relationship with the landowner. Clearly, this is the most important step to secure the right to work on a woodlot, improve the success of individual contractor operations, and help change the perception that the public now has towards those who conduct forestry operations. BMP's are also proposed for the most important forest operations including

harvesting, forest/wildlife management and road construction. These BMP's provide the broad guidelines for delivering the practice in a professional manner, respecting all forest values. Finally, there are BMP's proposed for Ensuring a Safe Operation and for self monitoring. Contractors are encouraged to take the time to assess the extent to which best practices are being followed. This enables the identification of the need for additional training, changes to operating procedures or perhaps even a change to equipment used on certain sites.

As a means to evaluate the success of the overall BMP manual the NFA will monitor the effectiveness of the program across all participating contractors. Once again it is intended to be constructive, to identify training needs, research issues and/or concerns that should be addressed by other sectors within the NFA partnership (i.e., industry, government, private landowners, environmental community). This manual is a work in progress and will be refined as feedback is provided.

We will also develop opportunities with the forest industry to have this manual recognized under various sustainable forest management systems. We want to make sure it meets the needs of Contractors and Operators and is supported by other forest stakeholders. This system is voluntary and will be implemented under the overall guidance of the Contractors and Operators Committee.

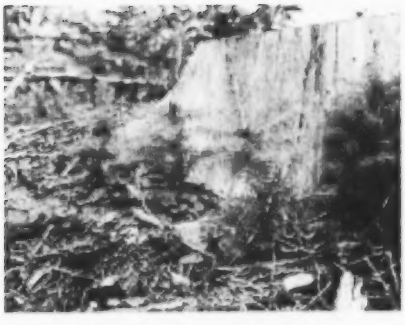
My thanks goes to the members of the Contractors and Operators Committee who have worked long hours in preparing this document and to the NFA for providing the opportunity and the resources to carry it out. It is now up to us as Contractors and Operators to make use of it and to communicate its value to our clients, the industry and woodland owners.

Yours sincerely,

Gerald Holmes
Chair, NFA Contractors and Operators Committee

Introduction: Sustainable Forest Management and the Contractor

In 1997, the Nova Scotia Government on behalf of all Nova Scotians adopted the National Forest Strategy. This committed Nova Scotia to sustainable forest management (SFM). Sustainable forest management was defined as "to maintain and enhance the long-term health of our forest ecosystems for the benefit of all living things both nationally and globally, while providing environmental, economic, social and cultural opportunities for the benefit of present and future generations". This means using our forest resources in a way that does not degrade the environment or deplete the resource.



Further to the national agenda, the Forest Products Association of Nova Scotia has adopted "Principles of Forest Stewardship in Nova Scotia" to provide leadership in how Nova Scotia's forests are managed.

In order to achieve these broad goals, we each must do our part. You often hear

act locally, think globally. The following Best Management Practices were designed to help you, the contractor to do your part in achieving SFM. Harvesting with consideration for regeneration helps ensure there will be a future stand of trees that will contribute to the long-term sustainability of the timber resource. Maintaining buffers along streams reduces the impact of forest operations on the aquatic environment.

You may wonder how Best Management Practices fit with other initiatives such as forest certification programs. Forest product consumers are beginning to request that wood be supplied from environmentally sound operations. Certification systems such as Canadian Standards Association, Forest Stewardship Council and SFI in the United States are being developed to certify forest operations. These certification systems improve a company's ability to market forest products. Forest companies must first adopt a system then undergo an independent audit of forest management operations or of a forest area to determine if they are compliant with the systems standards. Best Management Practices are often the tool used to describe acceptable practices against which operations will be evaluated. Adopting best management practices now will enable contractors to move toward sustainable forest management and comply with provincial legislation. Contractors and private woodland owners will be better positioned in a certified wood marketplace as a result.

More than 70% of Nova Scotia is privately owned, over half of which is owned in small private holdings. Some of the best lands for growing timber are on small private lands. Over 60% of all timber harvested in Nova Scotia in 1998 came from small private lands.

Perhaps even more important than these broad policy statements or industry trends are the results of the survey of woodland owners and the general public completed by the NFA in 2000. The survey was very successful in terms of the response rate and the degree of confidence in the results. The general public felt strongly about protecting the environment (90%) and the need to regulate harvesting contractors (86%). Woodlot owners were similar in their responses in the need to protect the environment (64%) and the need to regulate contractors (78%). This manual addresses both issues in that the practices outlined in this manual protect the environment and allow the contractors to take a proactive role in self-regulation.

Wood from small private woodland owners is not always available for harvesting. Small private landowners may choose not to harvest their woodland for many reasons. Some landowners are interested in maintaining an undisturbed natural forest, they may use their woodland for recreation and don't want harvesting or they may simply not be ready to consider harvesting. Opportunity is lost when landowners decide not to engage in forest management because of mistrust of the forest industry or because of fear of being taken advantage of.

Regretfully, this can come about as a result of just a few disreputable contractors. Word spreads quickly and the whole industry often gets painted with the same brush. This is why it is important for responsible contractors to make an extra effort in dealing with landowners.

The best management practices outlined in this manual are guided by a Code of Practice. This Code describes the overall principles that

guide the way activities take place on a forest operation. The code of practice proposed in this manual is designed to complement national and provincial initiatives such as the Forest Products Association Stewardship Principles but targets implementation at forest contractors and operators.

One BMP included in the manual outlines a method for contractors to use when dealing with landowners. The method involves a process to develop a relationship of mutual respect between the contractor and landowner. It is a process to help you demonstrate professionalism and fairness. Other operational BMP's provide tips for conducting the most common forestry operations such as constructing roads, harvesting trees and conserving wildlife habitat. If you are new to the contracting business, this manual can provide a useful checklist when dealing with landowners. If you have been a contractor for some time you may have already considered some of the points outlined here. The manual however, may help you improve present practices and you will likely find some new ideas to consider.

This manual has been developed with two levels of forestry practices in mind: *Standard* and *Enhanced*. Standard practices represent expected performance levels in forestry operations and will meet or exceed existing legislation and guidelines within the province of Nova Scotia. You, the contractor can present these practices to the landowner as the minimum acceptable standards on a forestry operation. Enhanced practices serve as an objective to reach over time where the best available knowledge and techniques are used to carry out operations that are environmentally, economically and socially viable.

Developing Landowner Agreements: Best Management Practices

Making Contact with the Landowner

Making contact with the landowner is the critical first step. First impressions are important and contractors need to approach landowners with honesty and professionalism. Your first step is to prepare thoroughly before meeting the landowner.

Preparing for the Interview

Standard Practices

- Prepare yourself mentally for the interview. Think about the landowner's point of view and what kind of reassurances and information they may want of you.
- Remember you need to take time to get to know the landowner. Try to establish a rapport. The best way to do this is by asking questions.
- Have some information about yourself. This can be written material such as pamphlets about your company, business cards, photos of past operations or just information you can tell the landowner. The idea is to show professionalism, not to brag.

- It is helpful to have information on the property on which you want to work. Things such as aerial photographs, property maps and woodlot size can be helpful when talking to landowners. You must use your judgement on when it is appropriate to use this information. Some landowners may feel you are checking up on them if you bring out the information too soon.

- You may want to have some information on current silviculture programs. Pamphlets are available for most programs. This is helpful even if you do not plan on doing silviculture work yourself. It demonstrates that you are committed to more than just cutting down trees.

- Allow time to walk the woodlot or portion of the woodlot with the owner.

Enhanced Practices

- Bring the landowner to other sites where you have worked to show quality of job done.

- Show landowners examples of other uses of the forest on their land – for example, a sugar bush or recreational trails.

- Develop a portfolio with photographs of previous work on other woodlots.

Owner's Objectives and Expectations

Standard Practices

It is important to remember that landowners have the right to manage their property according to their own objectives while meeting or exceeding government regulations. Contractors need

to take the time early in the process to determine what those objectives are.

- Asking questions is one of the most important approaches. You cannot ask too many questions. Objectives that may be important to landowners include: timber production, income generation, appearance, protection of old growth, wildlife, biodiversity, heritage values such as graveyards and old farm sites, recreational values such as walking, snowmobiling or having a camp. All are valid objectives. The plan should be developed to incorporate the landowner's objectives for the forest.

Enhanced Practices

- Suggest other forest management alternatives with respect to harvesting, silviculture and the potential for non-timber forest products.
- Complete a survey or questionnaire to assist in determining the landowner values and/or objectives for the woodlot.

Proposed Operation Plan

If you plan to perform a forestry operation on a particular woodlot, you likely have in your mind a rough plan of where you are going to work and how you are going to go about it. This is taken a step further in an operation plan by putting it on paper. An operation plan may be very simple, consisting of a single piece of paper showing the location of the proposed operation and legend, for

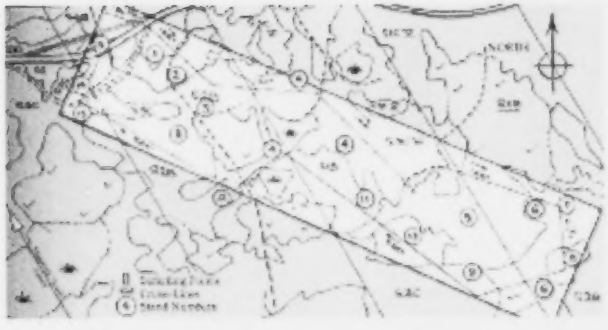
larger undertakings it may be more complex. Basically, an operation plan outlines what you intend to do, and:

- Demonstrates accountability and responsibility
- Shows due diligence
- Reduces misunderstandings
- Demonstrates a professional image
- Helps ensure quality work

Woodlot Assessment (Inventory)

An operation plan begins with determining what is on the woodlot. This will help determine what can be done to meet the landowners objectives. An assessment should include a number of actions:

- Conduct an inventory of forest products present on the site. The woodlot condition and the landowner requirements will determine what this inventory will consist of. The inventory may be a formal technical cruise or it may be a less formal descriptive type cruise.
- Identify all watercourses including springs, brooks, rivers, streams, ponds and lakes.



- Record observations of wildlife and habitat such as nests.

- Assess other items important in designing the operation such as: soft or wet ground, wetlands and areas of human interest such as old farm sites or graveyards.

Enhanced Practices

- Conduct assessment of broader woodlot values (i.e., non-timber) in consultation with a forestry professional.

- Identify the potential for prescriptions other than clearcutting.

- Identify special management areas such as old growth forests, unique or endangered plants or areas with significant wildlife habitat such as deer wintering areas.

- Identify opportunities to pursue work with other landowners/ contractors in the area to discuss small-scale landscape objectives.

Putting the Plan Together

The operation plan should include a description of the proposed operations and their location on a map. In finalizing the plan it will be important to re-examine landowner objectives to determine if all of them are met. The plan at this point may have to be revised if not all objectives can be met.

The plan should also include the following items:

Standard Practices

- Landowner objectives where applicable.
- A map outlining boundary lines and areas of operation.
- A description of the vegetation present on the area of operation including tree species and size.
- Area to be harvested, harvest prescription and the harvesting method and system to be used.
- Special management areas, wildlife clumps, sensitive or unique areas, recreational trails and grave-yards.
- Watercourses.
- The number of clumps, wildlife trees and Coarse Woody Debris (CWD) to remain after harvest.
- Stream crossings required and the methods for crossing the stream.

Enhanced Practices

The operation plan includes in addition to the above:

- Forest stand characteristics from the timber cruise such as stand age, stand health, site quality, stand volume and timber quality.

- Results of consultations with forestry professionals such as the potential for alternative treatments.
- Forest Inventory data, this can be in the form of a table.
- A general description of the type of prescription to be applied, where applicable e.g. shelterwood, thinning etc.
- Potential locations for clumps, corridors etc. detailed on an operating plan map.

Negotiations with the Landowner

Negotiations begin with doing your homework. A proposed operation plan for the landowner to look at demonstrates professionalism and responsibility. For example, a great deal of information can be conveyed on a map which can be easily understood by many people. You may also want to include the results of the timber inventory. This could be total volume by product and/or species.

- Go through the proposed operation with the landowner by showing what you plan to do.
- Explain the timing, type of operation, the boundaries of the operation and how you plan to do it.
- Make sure you explain how your proposed operation will help them meet their objectives.
- Detail any areas that will not be cut and why e.g. around hawk nests, sensitive areas or stream buffers.
- Agree on the financial arrangements.

- Be prepared to revise the operation plan to reflect the landowner's thoughts.

Enhanced Practices

- Visit the operation area with the landowner to review the operation plan

Helpful Hints on Financial Arrangements

- The best method of payment for both the contractor and landowner must be decided. The landowner should have talked with an accountant before this decision is made. If the landowner has not talked to an accountant, you should advise them to do so before finalizing an agreement.

- Two common methods of payment are lump sum (a complete payment based on what the contractor believes the timber is worth) or piece rate (payment is made as the timber is scaled). Each method has different implications under current tax laws. Type of payments can have impacts for contractors as well. For example lump sum payments may affect cash flow. All these aspects must be considered when negotiating with an owner and you may be able to offer several options.

- If the agreed arrangement is a piece rate payment, you will have to determine what scale will be used for payment. This could be roadside scale or mill scale. In the case of mill scale it is best to provide the owner with copies of all mill scale receipts.

- The Landowners may require some or all of the following items:
    - Liability insurance
    - Clear beginning and end dates of the harvest
    - A specific season of harvest

Agreement with the Landowner

Any agreement between people or companies should include a contract or lease. This will help protect both you and the landowner and will help avoid future mis-understandings. Contractors should consult a lawyer to develop an agreement that meets their needs.

Standard Practices

- Reference to the Operation or woodlot management plan, if applicable or a description or map of the area of operation
- Requirement to adhere to fire regulations
- Method and terms of payment
- Liability issues
- Cancellation/termination conditions
- Wildlife and environmental protection
- Road construction, maintenance and upgrading
- Timing of operation

- Definition of merchantable timber and minimum stump heights
- Reference to applicable laws such as Occupational Health and Safety Act, Workers Compensation Act, Forests Act, Wildlife Act, Environment Act, Water Act, Water Resources Protection Act, and Endangered Species Act.
- Binding of agreement to executors and heirs of the property in case something should happen to the landowner
- Extension of operation timing due to unforeseeable acts
- Provision for or against assignment of contract

Enhanced Practices

- In addition to providing a contract with all of the above listed items, the contract should be registered with a lawyer to provide additional protection to both parties.
- Provide a performance bond to the landowner (if requested)

Helpful Hints

Once you have an agreement with the landowner, your communications should not stop there. It is a courtesy that pays off in trust, to keep landowners informed of the progress of the operation. You may want to send a notice to the landowner a week before you actually start. You may also want to send a notice a week before you finish. Keep a paper trail of your activities for that woodlot, particularly mill scale receipts. You may not plan on using the information but it pays off to keep a paper record.

Road Construction: Best Management Practices

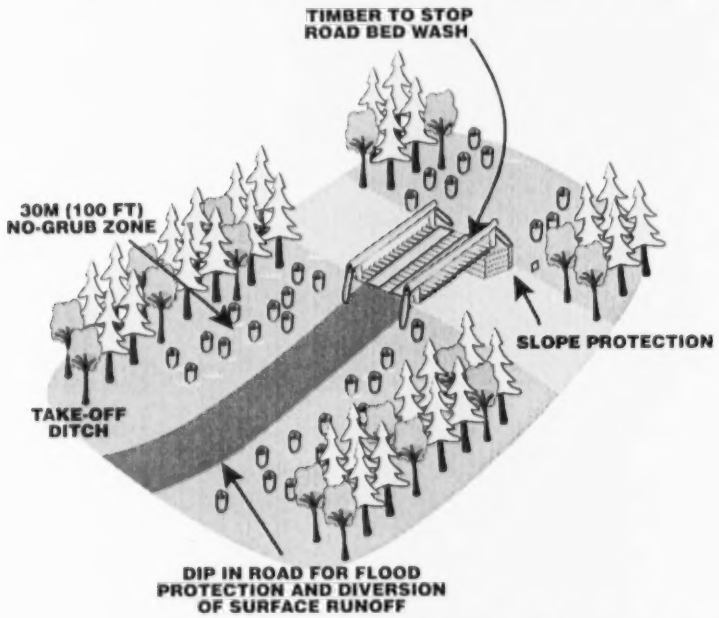
Roads have a major impact on a forested area including impacts on watercourses, drainage, access, wildlife habitat, soil erosion and the visual aesthetics of an area. Roads can enhance the benefits from the forest if constructed properly. Roads essentially take land out of forest production; as a result, careful consideration should be given to their location and requirements. Investing now in a well planned and constructed road will reduce long term maintenance costs and environmental impacts. The following outlines some best management practices that contractors can follow in order to provide the highest quality service to their customers in the design and construction of an access road.

Getting Started - Planning and Layout

Standard Practices

- Owner objectives must be identified and considered.
- The potential for multiple use of the road should be identified.
- Information should be gathered on the area such as topographic information, stream locations, special management features, soil types and drainage.

FEATURES OF A WELL-CONSTRUCTED BRIDGE


TIMBER TO STOP ROAD BED WASH
30M (100 FT) NO-GRUB ZONE
SLOPE PROTECTION
TAKE-OFF DITCH
DIP IN ROAD FOR FLOOD PROTECTION AND DIVERSION OF SURFACE RUNOFF

- Locate roads on stable ground (such as low slopes and high ground.)
- Avoid river valleys, steep slopes, swamps and rock ledges, fragile areas (e.g. thin sandy soils) and sensitive areas (e.g. marshes, deer wintering areas, hawk nests.)
- Minimize impact on watercourses by reducing the number of crossings and locate the road as far away from watercourses as possible.
- Prepare a preliminary sketch of the road location.
- Walk the proposed road location.
- Adjust road location to reflect site conditions.

- Note special features on the map (i.e., Watercourse crossings, landings etc.)
- Complete final sketch of the road location.
- Review road location with landowner and reach an agreement.
- Apply for and receive permits and applications i.e., approval for installation of bridge or culvert and DOT road access permits.

Enhanced Practices

- Consider the sight distance for landscape/aesthetic values.
- Road construction staff should be trained/equipped to implement best management practices.

Applying Road Construction Tools and Techniques

Standard Practices

- Use standard accepted road construction practices and follow all regulations (i.e. Woodlot Roads/Stream crossings., endangered species legislation)
- Ensure road is built with proper erosion control.
- Fuel and oil machinery more than 30m away from a watercourse on bare mineral soil.

- Dispose of used oil properly through a used oil recycle facility. Information is available through your fuel and oil supplier.
- Avoid having water running in a ditch for greater than 300m to minimize erosion.
- Use cross culverts to avoid blocking natural drainage.

- Use ditches or culverts to direct drainage through vegetation filters and not directly into streams.
- Construct stream crossings with the first priority placed on minimizing impacts on the aquatic ecosystem. This should include following all watercrossing regulations.
- Apply road construction practices that exceed minimum regulations such as crossing at the narrowest part and at right angles to the stream, crossing at location with stable soil and without steep sides and crossing where the stream is running relatively straight.
- Bridges must be constructed to the conditions in your permit and the provincial regulations.
- Compact soil around the culverts, use good foundation material and culverts should be cambered.

Enhanced Practices

- Seed roadsides or use brush mats.
- Use advanced construction techniques such as the use of a rock apron at the culvert outlet.

Helpful Hint

- Avoid using the road excessively during wet weather. This can damage the road and create erosion/sedimentation problems, especially in areas with steep slopes.

Temporary Stream Crossings for Forwarding Wood

Standard Practices

- Apply for temporary crossing permit, where applicable.
- Use brush mats or logs at ends of crossing.
- Cross at right angles to stream.
- Use a bed log on both stream banks.
- Do not put crossing structure in stream.
- Remove temporary crossing after operation.
- No silt should enter the stream.

Wildlife Habitat: Best Management Practices

Wildlife is an important forest value. Wildlife habitat can be defined as an area characterized by a distinct assemblage of landforms, aquatic forms, vegetation, soil and moisture regimes, that are considered to be important for a variety of selected wildlife species. Forest operations can either enhance wildlife habitat, detract from it or maintain the status quo. It is important to consider wildlife aspects at both the woodlot level as well as on adjacent woodlots. One extremely important aspect to consider is endangered species. The Nova Scotia Department of Natural Resources maintains a list of species that are considered to be vulnerable and therefore may need special conservation measures to be implemented.

Wildlife Habitat Planning

Adequate information should be available in order to integrate wildlife considerations into forest operations. For example, the following should be considered in the design of any forest operation:

Standard Practices

- Consult with the department of natural resources to determine if there are any issues concerning endangered species
- Watercourses on the property must be located and the impacts of the proposed operation on the watercourse considered (see BMP Buffer zones).
- Wildlife features such as nesting areas or other significant habitats should be located on the property and their impact on the operation considered.
- The landowner's objectives for wildlife habitat should be identified and considered.

PHOTO: DEPARTMENT OF NATURAL RESOURCES

Enhanced Practices

- Where the significance of a wildlife feature is unclear, wildlife expertise should be consulted.
- Landscape level issues should be considered in the design of the forest operation. For example adjacent woodlot harvests could have an impact on cut size, the need for clumps and corridors.
- In general, it is recommended that approximately 8% of older stands are left not harvested.
- Staff conducting operations should be trained and equipped to apply wildlife best management practices.

Applying Tools and Techniques for Wildlife Habitat

Developing a Variety of Forest Habitats - Harvest Design:

Standard Practices

- Harvest prescriptions that promote natural regeneration of longer-lived species should be considered where applicable (i.e., red and black spruce, white pine, hemlock, red oak, sugar maple, yellow birch).
- If the prescription is clearcut, areas should not exceed 50 hectares (125 acres) except where required as a result of blowdown, insect and disease damage or fire.
- If cutting next to an old cut, wait until regeneration is at least 2m tall to avoid creating cuts that exceed 50 hectares (125 acres).
- Blocks should follow stand or landform boundaries to create irregular cut boundaries.
- In cuts exceeding 50 hectares, wildlife corridors 50 metres in width should be used to join uncut areas.

The BEST corridors provide high cover:

- shrubs
- dense young softwoods
- low lying areas

- Trees within the corridors can be selectively cut ensuring that a minimum of 20 m^2 of basal area is left at all times.
- Leave green wind-firm trees within the corridors

Protecting Aquatic Ecosystems

When forests are harvested near streams, special management zones (SMZ's) should be established along each side to leave enough vegetation for stream protection and to maintain the rich wildlife community. The ideal buffer zone involves minimal disturbance within a minimum of 20 metres of the watercourse.

Standard Practices

Watercourses less than 50cm

- Vehicles cannot be operated in the 7m zone adjacent to the watercourse.
- Ground vegetation such as small trees, shrubs and herbs must be left intact within the 20m zone.

Watercourses greater than 50cm

- Vehicles cannot be operated in the 7m zone adjacent to the watercourse.
- Trees within the buffer zone may be selectively cut leaving a minimum of 20m^2 of basal area.
- Leave green windfirm trees within the corridors.
- Increased buffer width is required if slopes are greater than 20%. Add one metre for each 2% increase in slope.
- No opening larger than 15m in the dominant tree canopy should be created.

The Best Buffer is the widest buffer possible.

The BEST clumps:

- have an average tree diameter less than 20 cm.
- have at least 10% dead trees.
- have trees with old feed cavities.
- are at least 0.02 ha (10x20m).
- have aspen (popple), red maple, yellow and white birch.

Providing Snag/Cavity trees

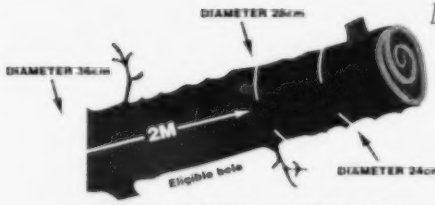
At least one third of Nova Scotia's wild animal species use snags and cavity trees during their life. The following should be considered to provide this habitat in harvest areas:

Standard Practices

- Leave cavity and snag and potential snag and cavity trees in clumps
- 1 clump for every 8 ha cut or part thereof (no clump required for areas less than 3 ha)
- e.g., a 9 ha cut area would require 2 clumps.

A good way to make a clump:

1. Try to find a good cavity tree dbh> 30 cm with wood pecker holes, living or dead.
2. Leave living or dead trees around the snag to make the clump. At least 10 living or partially living trees/ha should be left standing. The clump is to be representative of the original stand in species mix, height and diameter.
3. Sugar Maple and Yellow Birch are preferred however Aspen, White Birch or Red Maple can be used also.



AVERAGE STUMP DIAMETER = 30cm

Downed Woody Material

1. Leave 150 lineal meters per hectare of large boles to be scattered evenly across the site. This can be non-merchantable material. To qualify as bole material the diameter of the bole lengths must be no less than the average cut stump diameter < 2 cm.

Protecting Significant Wildlife Habitat:

Sometimes the forest may contain certain characteristics that make it more important to wildlife species than a similar forest nearby. These areas are called significant wildlife habitat. They can be any or all of the following:

- A site that is one of only a few in the province,
- Is used by plants or animals having a low population in the province (species at risk),
- Is used by unusually large concentrations of wildlife.

Some examples of these sites that may be encountered are:

Deer Wintering Areas

- Provide thermal and snow cover for deer
- Typically mature conifers on South/South-west slopes.
- Look for heavy browse & lots of tracks.

Raptor/Heron Nests

- Look for large structures in trees
- Occupied March to mid July

Local interest groups as well as the Nova Scotia Department of Natural Resources have gathered information on these sites and have created wildlife habitat maps. Contact the Department of Natural Resources prior to operations to determine if there is any significant wildlife habitat areas present on the woodlot.

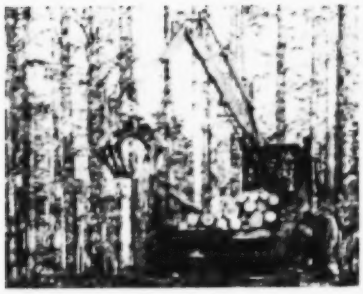
Harvesting Best Management Practices

Harvesting Considerations

Harvesting is a forest practice that has a significant impact on the environment. Improperly designed and implemented harvest operations and roads can leave a long lasting negative impression on the forest industry. Harvest operations can be designed to accommodate environmental, economic and social values. The following best management practices will contribute to sustainable forest management.

Getting the Prescription Right - For the Forest and the Landowner

The first step in setting a prescription for a woodlot is to determine the landowner's objectives. This step can eliminate some of the choices and simplify the decision of which prescriptions are appropriate. A variety of objectives can be met by setting the proper prescription including recreation, old growth, wildlife habitat conservation and fibre production. Financial assistance may be available in some cases and contractors are encouraged to refer to the Nova Scotia Forest Sustainability regulations for further information. Some prescriptions may favor one objective over the other but the ultimate decision rests with the landowner.



Getting the prescription right involves collecting the proper information about the forest to assist in the determination of the prescriptions. The next step is to arrive at a prescription or prescriptions that are viable with respect to the forest and that consider the landowners objectives. With this information in hand, the landowner can make an educated decision about which prescription is most appropriate to meet the objectives.

Determining the Forest Type and Structure

In order to determine the range of viable prescriptions possible on a woodlot, an assessment of the forest type and structure is necessary. This assessment should be conducted as part of the development of the operation plan and should include the following items:

- Soil type – texture, drainage and site quality
- Description of the major tree and plant species present on the site
- Stand characteristics such as age, health, tree size, density and growth rate
- Stand history – determine if any previous treatments have been done
- Terrain – slope and obstacles to equipment
- Presence of advanced regeneration

- Potential for high value products such as veneer or sawlogs

The items listed above will assist the landowner and contractor to determine which of the following prescriptions may apply to the woodlot.

Silviculture Treatment/ Harvest Options

Nova Scotia lies in the Acadian Forest Region. The natural forest is characterized by stands of trees having various sizes, ages, and mixtures of species. Long lived species — red spruce, white pine, hemlock, sugar maple, yellow birch, white ash — predominate. Besides being ecologically appropriate, these species can provide the most economic benefits to landowners and the larger community.

Harvesting and land use practices over the past three hundred years have altered natural forest development in Nova Scotia. Many forest stands are now even aged and contain more of the shorter-lived tree species (balsam fir, black and white spruce, larch, red maple, white birch, and poplar).

There is increasing emphasis being placed on natural regeneration as opposed to planting of harvested areas. Furthermore, there is recognition that less aggressive harvesting systems than the clearcut system (currently over 98% of harvest is with clearcut system) have tremendous application in the Acadian Forest. The sustainability regulations promote a range of treatment options eligible for financial assistance in order to promote more partial harvesting over clearcut harvest practices. These treatments place

more emphasis on the ecological, social and aesthetic values of the forest and therefore have greater potential to achieve society's objectives for the forest. While shelterwood and selection harvesting (low impact forestry) can result in higher wood production costs and therefore potentially less immediate return to the landowner and the contractor, in the long term these treatments can save forest management costs (such as planting and tending) and produce higher value forest products and a greater diversity of habitat for wildlife. As the quality of the stand increases over time the economics become more favorable.

The following is a brief description of the harvesting prescriptions including the appropriate forest conditions for application and their objectives. They are listed by the age class structure that they tend to create, even aged and uneven aged. For more information on the following prescriptions, there are several resources listed in the background information section.

The age class structure of a stand refers to the relative ages of the trees making up the stand. Even age stands generally result from stands composed of trees that begun growing at about the same time. Uneven aged stands refer to stands that have trees of various ages from juvenile to mature present on the same site.

Clearcut System

Clearcutting can be defined as preparing the site for the establishment of a new even aged stand. Regeneration can be

achieved naturally by sprouting and seeding or by artificial means such as planting or direct seeding. This system is most applicable in stands dominated by shorter lived, lower value species such as white spruce, fir and the intolerant hardwoods. If applied in forests with longer lived species such as red spruce, cut sizes should be reduced to allow for natural seeding from adjacent stands.

Two variations on this prescription are possible in the Acadian forest – strip cutting and patch cutting. These variations will tend to decrease the cut size, promote better natural regeneration and favor some wildlife species when compared with conventional clearcutting.

Seed Tree System

This system is similar to the clearcut system except that several trees per hectare are left standing to assist in the natural regeneration of the site. The number of trees to be left standing ranges from 25 to 35 per hectare and they should be wind-firm, good quality trees to provide seed for the next crop. The seed trees may be harvested after the stand has been regenerated if this can be accomplished without too much damage to the new stand. This system generally applies to stands that are dominated by White Pine and do not have tight crown closure.

Shelterwood System

Shelterwood harvesting involves the removal of the overstory in several stages over a few years. The new stand is established under the cover of the existing forest. This treatment is most

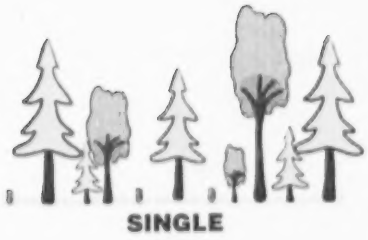
applicable where low light conditions and cool temperatures are required for regeneration of the forest. Sites where shelterwood is an applicable prescription generally have tight crown closure with little advanced regeneration and can be composed of entirely or in mixed stands of White Pine, Red Spruce, Eastern Hemlock or Tolerant Hardwoods.

The Selection System (low impact forestry)

The selection system is used in cases where the objective is the retention of the forest cover. It can also be used where the primary objective is to restore or maintain the typical Acadian Forest. Tree removal is done at regular intervals of 5 to 20 years and involves the removal of individuals or small groups of trees. This system simulates one of the natural disturbance patterns present in the Acadian forest where old mature trees would die or blow down and they would be replaced by younger trees. The result of this system is an uneven aged stand where regeneration is established almost continuously.

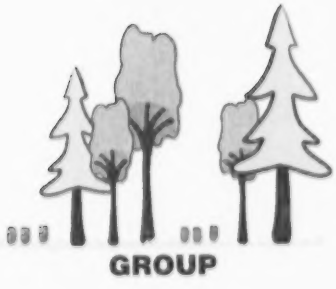
In some stands where insufficient quality trees remain, where the trees are too old or where operability constraints exist such as potential for blowdown, it may be necessary to remove the existing stand and encourage renewal with appropriate species. Two types of selection harvesting commonly used are single tree or group selection

Single Tree Selection



This treatment focuses on the removal of individual trees from the stand at regular intervals. The resulting stand will be composed of trees with a range of ages and sizes although this can take several passes to accomplish. Generally this treatment is applied in quality hardwood stands but it can be applied to virtually any forest stand depending on the objective.

Group Selection



The objective of this treatment is to create a mixture of small groups of similar forest throughout the stand. Groups may be fairly large initially but the goal of this treatment is to remove groups not exceeding twice the stand height. Species selection should favor higher value species that are best suited to the site with the objective of producing products such as veneer logs, specialty woods and large diameter logs. Group selection is also appropriate where several age classes exist in the forest already and where there are remnants of an over-mature canopy present on the site.

Making the Decision

Informing the landowner of the potential options for harvesting prescriptions is an important role for the contractor to play. In addition to this, the contractor should also attempt to educate the landowner about the alternatives to even aged management.

However, the ultimate decision on what to do with the forest rests with the landowner. It is a good practice to present the landowner with several prescriptions that address their objectives and recognize the values present in the forest.

Harvest Planning

Standard Practices

- Harvest planning should consider wildlife habitat, aquatic ecosystems, and the provision of snags and downed woody material. See Wildlife Habitat BMP's.
- The harvest prescription selected should consider landowner objectives, natural disturbance patterns and stand specific conditions. It should also specify criteria for tree selection where applicable.
- The area to be harvested should be identified on the ground and flagged.
- Special Management Zones should be located and flagged for field crews.
- Harvesting operations should be planned with consideration for regeneration, use appropriate harvesting methods for the particular site and try to encourage natural regeneration.
- Wood extraction trails should be located to minimize environmental impact.
- Harvesting should maximize the production of high value products while minimizing waste, within market constraints.

- Consider harvest timing to accommodate market conditions or seasons (i.e., Veneer or white pine logs can deteriorate quicker in hot summer months).
- Watercourse requirements must be recognized in the placement of extraction trails, landings, and crossings.
- Locations for piling wood should be identified and should consider local hazards and constraints (for example power lines, traffic flows, right of ways and other uses for the area).
- When the equipment available to a contractor is not suitable for the harvest area or agreed upon prescription the contractor should refrain from completing the work or provide the landowner with the option to choose another contractor.

Enhanced Practices

- Consider impacts of harvesting on viewscapes and other landowners.
- Harvest boundaries should be located along naturally occurring features (streams, stand types, topography)
- Where selective cuts are prescribed - areas should be identified and operators should be aware of how to select trees to be harvested. Advance marking of at least some of the trees may be a useful technique.

Standard Practices

- Follow Occupational Health and Safety regulations on all harvesting sites.
- Be aware of and follow all requirements for fire fighting during fire season.
- Avoid deep rutting by keeping machinery away from soft or wet ground, use brush matting where required to minimize rutting.
- Remove all garbage from the site and dispose of hazardous materials properly.
- Optimize utilization by minimizing stump height and processing trees to acceptable minimum top size.
- Use caution and proper procedures in the handling and storage of harmful substances.
- Keep all boundaries, roads and recreational trails free of debris.
- Never allow machinery or debris into a watercourse.
- Avoid operating during excessively wet periods to avoid rutting, soil compaction and erosion.
- Avoid damaging advance regeneration.
- Avoid damaging roads, culverts and ditches with forwarding and harvesting machinery.
- Fuel and oil machinery more than 30 metres away from a watercourse on bare mineral soil.

- Dispose of used oil properly through a used oil recycle facility. Information is available through your fuel and oil supplier.

Enhanced Practices

- Repair damage done to forwarder/skid trails and access roads.

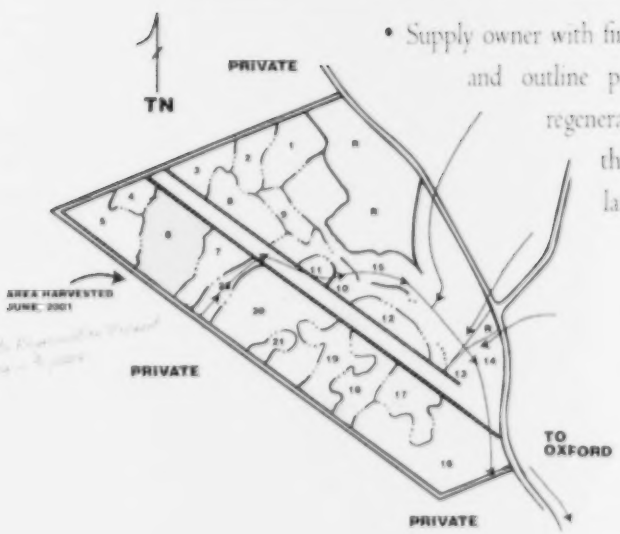
Post Harvest Activities

Standard Practices

- Record information on volume harvested.
- Complete audit checklist.
- Repair any damage to roads and environment.
- Ensure that landowner is satisfied with the operation.

Enhanced Practices

- Supply owner with final sketch of cutover and outline process for ensuring regeneration occurs including the re-vegetation of landings.



Ensuring A Safe Operation: Best Management Practices

Nova Scotia's Occupational Health and Safety Act provides for the promotion, co-ordination, administration and enforcement of occupational safety and health. Occupational health and safety involves five essential elements:

- Prevention
- Internal responsibility
- External support (training)
- Enforcement (monitoring)
- Response to changing needs (updating procedures)

Forest Operations raise unique challenges for contractors and operators. The nature of forest work and the variation in environmental conditions including stand conditions, presence of high winds coupled with the use of mechanized equipment and manual felling can create dangerous work situations for both the contractor as well as visitors to the site. The following practices are considered mandatory and are described more fully in the "Forest Professional".

Standard Practices

- Protective equipment and clothing appropriate to the equipment or operation you are working with must be worn by the forest worker. Equipment must be approved as outlined in the "Forest Professional" and be kept in good repair.

- Contractors must understand and act in accordance with the occupational health and safety act and regulations, codes of practice and other applicable acts and or regulations.
- Equipment must be operated by trained operators who can safely operate the equipment without supervision.
- Workers must be capable and able to carry out the work in a safe manner.
- Contractors must undertake periodic visual checks of any employee working under hazardous conditions or develop other effective measures for seeking help in the event of an emergency.

- First aid supplies and services must be made available as required by Occupational Health and Safety regulations including adequate first aid supplies, someone at each worksite certified in first aid and a communications plan in place in case of emergency.
- Safe operating practices must be adhered to for the operation of chainsaws, mechanical felling equipment and other equipment used in a forest operation.
- Correct logging and road construction practices must be used in order to protect the safety of workers and others as outlined in the "Forest Professional".
- A valid remote location plan must be filed when working in remote areas.

Enhanced Practices

- Adequate records maintained on all employees to ensuring training is current and to permit planning and scheduling of additional training needs.

Self Auditing: Best Management Practices

Performance Monitoring

Performance should be continuously monitored and adjusted in order to ensure that best management practices are being adhered to and that established objectives are being met. A system of recording performance is useful. It provides the contractor with a tool to assist them in completing a thorough performance review as well as documentation which can be supplied to wood purchasers or landowners to illustrate compliance with best management practices.

The following checklists will make it easy for the contractor to determine if the operation meets best management practices and to identify where improvements are required.

Standard Practices

- It is recommended that the contractor complete the checklist at three stages of operation:

  -Before the operation starts

  -During the operation

  -Post operation

- Only those practices that are relevant to the operation need be assessed. This program of operation will enable the contractor to identify practices or areas which need improvement early in the operation as opposed to after it is completed.

Enhanced Practices	Comments
• Provide landowner with completed checklists • Maintain paper copy for future reference and provision to wood purchasers	

Self Audit Checklists

Comments

Developing Landowner Agreements: Best Management Practices

Before meeting the landowner:

	Standard	*Enhanced*
• Information gathered on the woodlot; maps, air photos etc.	[ ]	
• Information provided to landowner on forest operations	[ ]	
• Portfolio made available with photographs of previous work		[ ]

Discussed during the Landowner Interview:

	Standard	*Enhanced*
• Landowner 's objectives	[ ]	
• Forest management alternatives – harvesting, silviculture, non-timber	[ ]	
• Survey to determine landowner objectives administered		[ ]

Woodlot Assessment

	Standard	*Enhanced*
• Inventory of forest products	[ ]	
• Observations of wildlife and habitat recorded	[ ]	
• Watercourses identified	[ ]	
• Other operating constraints identified (areas of human interest, wet areas).	[ ]	
• Assessment of broader woodlot values conducted		[ ]
• Potential for prescriptions other than clearcutting identified		[ ]

		Comments
• Special Management Areas (i.e., significant habitat, old growth, endangered plants etc.) identified	[ ]	
• Opportunities to work together with other landowners identified	[ ]	

Operation Plan includes:

	Standard	*Enhanced*
• Landowner objectives	[ ]	
• A map showing boundary line and areas of operation	[ ]	
• Description of vegetation on areas of operation (tree species and size)	[ ]	
• Area to be treated, prescription, method and system to be used	[ ]	
• Watercourses identified	[ ]	
• Forest/Wildlife requirements identified	[ ]	
• Stream crossings and method of crossing noted	[ ]	
• Forest stand characteristics from inventory		[ ]
• Consultations with forestry professional to assist in development of plan		[ ]
• Forest inventory data included		[ ]
• Special management areas identified		[ ]
• Brief Description of type of prescription		[ ]
• Potential locations of wildlife management features		[ ]

Negotiation and Agreement with landowner

	Standard	*Enhanced*
• Operation plan reviewed with the landowner	[ ]	
• Method of payment agreed upon	[ ]	
• Revisions incorporated to meet landowner needs	[ ]	

		Comments
• Visit area(s) of operation with landowner	[ ]	
• Provide landowner with contract or lease	[ ]	
• Register contract with lawyer	[ ]	
• Provide performance bond	[ ]	

Road Construction: Best Management Practices

Planning and layout

	Standard	*Enhanced*
Owner objectives and approval of road location determined	[ ]	
Fragile/sensitive areas avoided	[ ]	
All required permits in place	[ ]	
Sight distance/aesthetics considered		[ ]

Construction

	Standard	*Enhanced*
ditches/culverts adequate – road well drained	[ ]	
erosion control has been implemented	[ ]	
water crossings properly installed	[ ]	
site clean of garbage and machinery	[ ]	
road sides seeded or brush mats installed		[ ]

Temporary Stream Crossings

	Standard	*Enhanced*
installed in accordance with guidelines	[ ]	
removed the temporary crossing	[ ]	

Harvesting and Wildlife Habitat: Best Management Practices

Planning

	Standard	*Enhanced*
- Determined if any issues concerning endangered species	[ ]	
- Landowner objectives considered	[ ]	
- Wildlife features identified and considered	[ ]	
- Watercourses identified	[ ]	
- Prescription based on owner objectives and forest type and structure	[ ]	
- Owner advised of prescription options	[ ]	
- viewscapes considered in harvest design	[ ]	
- harvest boundaries aligned with natural landscape features		[ ]
- adjacent woodlot forest condition considered		[ ]
- old growth identified		[ ]
- landscape level issues considered		[ ]

Implementing the Harvest

	Standard	*Enhanced*
- harvest prescription appropriate	[ ]	
- clearcut area less than 50 ha.	[ ]	
- Corridors installed where required	[ ]	
- Clumps left standing as per BMP	[ ]	
- Large woody debris left on site	[ ]	
- Special management areas addressed	[ ]	
- Cutblocks –irregular shaped to increase edge habitat	[ ]	
- Water course requirements met	[ ]	

- Machine exclusion zone adhered to	[ ]	
- Basal area left in buffers	[ ]	
- Ground vegetation disturbance	[ ]	
- Buffer width adequate	[ ]	
- Viewscapes addressed		[ ]
- Harvest boundaries located along naturally occurring features		[ ]

Harvest Follow-up

	Standard	*Enhanced*
- regeneration plan is in place for harvest area	[ ]	
- follow-up communicated to landowner	[ ]	
- garbage/equipment removed from site	[ ]	
- landowner satisfaction verified	[ ]	

Health and Safety: Best Management Practices

	Standard	*Enhanced*
- Work conducted in accordance with Health and Safety act	[ ]	
- Safety equipment utilized and operators trained in equipment use	[ ]	
- Periodic visual checks implemented	[ ]	
- occupational health and safety act and emergency numbers visible	[ ]	
- Fire and first aid equipment on site	[ ]	
- Forest fire index checked	[ ]	
- Safety/remote location plan in place	[ ]	

Additional Resources:

Developing Landowner Agreements

Getting More From Your Woodlot – An Introduction to Integrated Resource Management Nova Scotia Department of Natural Resources Extension Services Division

Managing Woodlot Finances: Income Tax and Estate Planning Guide – Nova Scotia Department of Natural Resources Extension Services Division

Making the Most of Your Woodlot – Nova Forest Alliance

Woodlot Opportunities Plan – Nova Forest Alliance

Your Forest Management Plan – Forest Practices 1 Pamphlet – Nova Scotia Department of Natural Resources

Forest Surveys and Boundary Lines – Forest Practices 3 Pamphlet – Nova Scotia Department of Natural Resources.

Integrated Resource Management Pamphlet and Video – Nova Scotia Department of Natural Resources Extension Services Division or Canadian Forest Service

Selling Standing Timber Pamphlet – Nova Scotia Department of Natural Resources Extensions Services Division.

Your Forest Management Plan Forest Practices 1- Pamphlet – Nova Scotia Department of Natural Resources

Forest Sustainability Regulations – Information leaflet FOR-3, Nova Scotia Department of Natural Resources.

Forests Act: Forest Sustainability Regulations – Nova Scotia Government

A True Picture –Taking Inventory of Your Woodlot – Eastern Ontario Model Forest

Road Construction

Woodlot Roads/Stream Crossings Manual – Nova Scotia Department of Natural Resources

Environmental Protection Act – Activities Designation Regulations – Nova Scotia Government

Building Woodland Roads Forest Practices Pamphlet 2 - Nova Scotia Department of Natural Resources

Wildlife Habitat

Logging for Wildlife – Nova Scotia Forestry Association

Forestry/Wildlife Guidelines – Nova Scotia Department of Natural Resources

More Wildlife on Your Woodlot – Nova Scotia Department of Natural Resources

Woodlot Recreation – Module 9 Woodlot Management Home Study Course – Nova Scotia Department of Natural Resources – Extension Services Division

Nova Scotia Endangered Species Act, Nova Scotia Government.

Harvesting

Harvesting Systems – Module 2 Woodlot Management Home Study Course – Nova Scotia Department of Natural Resources – Extension Services Division

Forestry/Wildlife Guidelines – Department of Natural Resources

Forestry Field Handbook – Department of Natural Resources

Hardwood Thinning Manual – Nova Scotia Department of Natural Resources

Shelterwood Harvesting Manual – Nova Scotia Department of Natural Resources

Merchantable Thinning Manual – Softwoods – Nova Scotia Department of Natural Resources

Nova Scotia Forest Practices Pamphlets – 13 (Clearcut Method), 14 (Selection Method), 15 (Seed Tree Method), 16 (Release Cutting) – Nova Scotia Department of Natural Resources

Woodlot Management Home Study Course - Modules 1-10. Nova Scotia Department of Natural Resources. http://www.gov.ns.ca/natr/regional/extension.

Ensuring a Safe Operation

The Forest Professional – Guidelines for the Stewards of Tomorrow's Forests. Occupational Health and Safety Division – Nova Scotia Department of Labour

Nova Scotia Forest Practices 10 –Safe Felling and 11 – Safety from stump to roadside. Nova Scotia Department of Natural Resources.

Woodlot Management Home Study Course – Module 6 – Chainsaw Use and Safety – Nova Scotia Department of Natural Resources Extension Services Division.

Self Auditing Best Management Practices

The SFM Essentials – An introduction to the Sustainable Forest Management Standards – Canadian Standards Association.

Useful Phone Numbers

General Forestry Information and Research

Canadian Forest Service – Atlantic Forestry Centre – Fredericton (506) 452-3500

Canadian Forest Service – Nova Scotia (902) 893-0099

Nova Forest Alliance – Nova Scotia's Model Forest (902) 639-2921

DNR Extension Services Division (902) 424-6295 or (902) 424-5444

DNR Forestry Division (902) 893-5671.

DNR -Forestry Offices Central Region

DNR Bible Hill (902) 893-5620

DNR Hants East (902) 758-3437

DNR Middle Musquodoboit (902) 384-2290

DNR Waverly (902) 861-2560

DNR – Windsor (902) 798-2016

Nova Scotia Forestry Association (902) 893-4653

Forest Products

Christmas Tree Council of Nova Scotia (902) 895-6914

Forest Products Association of Nova Scotia (902) 893-1197

Wildlife Habitat

DFO – Conservation and Habitat Protection- Truro (902) 895-5946

DNR Wildlife Division – Kentville – (902) 679-6091

DNR- Integrated Resource Management Central Region – Wildlife Biologists (902) 893-5620

Emergency Reporting of Forest Fire and Game Infractions 1-800-565-2224

NS Department of Fisheries and Aquaculture Inland Fisheries (902) 485-5056

Forest Protection

Department of Environment – Truro (902) 893-5880

DNR Forest Protection Branch/Forest Fire Centre, Shubenacadie (902) 758-2232

Environment Canada Weather Consulting Service 1-900-565-5555

DNR – Integrated Pest Management (902) 758-2232

Fire Departments – 911

Environment Canada, Environmental Protection Branch (902) 426-7231

Environmental Emergencies 24 hrs. 1-800-565-1633

Transportation and Public Works, northeastern district – Truro (902) 893-5780

Health and Safety

Medical Emergency – 911

Truro Hospital – (902) 893-4321

Windsor Hospital (902) 798-8351

Forest Safety Society of Nova Scotia (902) 895-1107